In the Claims

1. (canceled) A process for anisotropically dry etching a compound semiconductor heterostructure, said process comprising:

selectively masking a surface of the heterostructure; and

exposing the masked heterostructure to a plasma comprising a mixture of hydrogen bromide and nitrogen to anisotropically etch the unmasked portion of the heterostructure in a direction generally perpendicular to the major surface.

2. (canceled) The process of claim 1 further comprising maintaining the semiconductor heterostructure at a temperature above 160°C.

3. (canceled) The process of claim 1 wherein the semiconductor heterostructure contains Indium.

4. (canceled) The process of claim 1 wherein the semiconductor heterostructure includes at least one of InP, InGaAs and InGaAsP.

5. (canceled) The process of claim 1 further comprising the step of performing the process with an inductively coupled plasma etching system.

6. (canceled) The process of claim 1 wherein the etching is performed at a rate of at least 2 μm/minute.

7. (canceled) The process in claim 1 further comprising the step of maintaining a pressure of approximately 5 mtorr during etching of the heterostructure.

8. (currently amended) A method of etching a substantially vertical feature in a semiconductor substrate in a vacuum chamber, said method comprising:

depositing a mask on the semiconductor substrate;

maintaining the temperature of the semiconductor substrate in the vacuum chamber above approximately 160°C;

introducing a nitrogen containing gas and a hydrogen bromide containing gas into said vacuum chamber, said nitrogen containing gas having a volumetric flow rate that is less than said hydrogen bromide containing gas;

igniting a plasma in the vacuum chamber;

forming a nitrogen containing layer on the semiconductor substrate from ~~a~~ said nitrogen containing gas; and

etching the semiconductor substrate with ~~a~~ said hydrogen bromide containing gas.

9. (original) The method of claim 8 wherein the semiconductor substrate further comprises Indium.

10. (original) The method of claim 8 wherein the semiconductor substrate further comprises at least one of InP, InGaAs and InGaAsP.

11. (original) The method of claim 8 further comprising the step of performing the etching step with a high density plasma source.

12. (original) The method of claim 11 further comprising the step of performing the etching step with an inductively coupled plasma source.

13. (original) The method of claim 8 wherein the etching is performed at a rate of at least 2 μm/minute.

14. (original) The method of claim 8 further comprising the step of maintaining a pressure in the vacuum chamber of approximately 5 mtorr.

15. (withdrawn) A device for etching a feature in a semiconductor substrate wherein said feature is substantially perpendicular to the surface of the semiconductor substrate, said device comprising

a heater for maintaining the temperature of the semiconductor substrate at a temperature above approximately 160°C; and

a gas supply for providing a mixture of hydrogen bromide and nitrogen for use in etching the semiconductor substrate.

16. (withdrawn) The device of claim 15 further comprising an inductively coupled plasma source.

17. (withdrawn) The device of claim 15 wherein the semiconductor substrate contains at least some Indium.

18. (withdrawn) The device of claim 15 wherein the semiconductor substrate further comprises at least one of InP, InGaAs and InGaAsP.

19. (withdrawn) The device of claim 15 further comprising etching means for etching the semiconductor substrate at a rate of at least 2 μm/minute.

20. (withdrawn) The device of claim 15 further comprising a pressure regulator for maintaining a pressure of approximately 5 mtorr during the etching of the semiconductor substrate.